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IS : 3442 - 1980

Indian Standard

METHOD FOR
DETERMINATION OF CRIMP AND COUNT
OF YARN REMOVED FROM FABRICS

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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October 1980

**AMENDMENT NO. 1 MARCH 2000
TO
IS 3442 : 1980 METHOD FOR DETERMINATION OF
CRIMP AND COUNT OF YARN REMOVED FROM
FABRICS**

(First Revision)

(*Page 4, clause 1.3*) — Substitute the following for the existing clause:

‘1.3 This standard is applicable to yarns which stretch less than 5 percent when tension on yarn is increased from 0.25 to 0.75 g/tex. By mutual agreement it may be adapted to yarns which stretch more than 5 percent by use of pre-tension lower than the specified method for elastomers or use of tension higher than that specified in this method to remove crimp out of textured yarns.’

(TX 01)

Reprography Unit, BIS, New Delhi, India

Indian Standard

METHOD FOR DETERMINATION OF CRIMP AND COUNT OF YARN REMOVED FROM FABRICS (*First Revision*)

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Indian Standard
METHOD FOR
DETERMINATION OF CRIMP AND COUNT
OF YARN REMOVED FROM FABRICS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 14 January 1980, after the draft finalized by the Physical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 This standard was first published in 1966 and prescribed a method for determination of crimp percent and the approximate count of warp and weft yarns after removal of the sizing and finishing materials from the fabric specimens. It has now been revised to include the use of crimp testers.

0.3 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes a method for determination of crimp and count of yarn removed from any textile fabric in which yarns are intact and can be removed in measurable lengths. In case the fabric contains plied or cabled yarn, the method is applicable for determination of its resultant count.

1.2 The count of yarn determined by this method may not, however, be expected to agree with the count of grey yarn used for weaving the fabric because of the changes brought about in the yarn count by the processing treatments as well as the treatments prescribed in this standard for removal of the added matter.

*Rules for rounding off numerical values (revised).

IS : 3442-1980

1.3 This standard is not suitable for those yarns removed from fabrics where considerable waviness remains after application of stipulated tension.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS : 232-1967* and the following shall apply.

2.1 Crimp Percent — The difference between the straightened length of yarn and the length of yarn while in the cloth, expressed as a percentage of the latter.

3. SAMPLING

3.1 Samples shall be so drawn as to be representative of the lot. Samples drawn in accordance with the procedure laid down in the material specification or as agreed to between the buyer and the seller shall be taken as representative of the lot. In case the test is to be performed on small samples of fabrics, care shall be taken to take specimens as representative as possible and it should be reported in the test report.

NOTE — In the case of cotton fabrics, samples from the lot shall be drawn in accordance with IS : 3919-1966†.

4. APPARATUS

4.1 A device capable of measuring the straightened length of yarn provided with two clamps, the distance between which is adjustable and through one of which a known tension can be applied. Each clamp shall consist of two jaws, preferably metallic, having parallel gripping surfaces.

NOTE — Any available crimp tester may be used for the purpose.

4.2 Balance — capable of weighing correct to a milligram.

5. PREPARATION OF TEST SPECIMENS

5.1 From the various portions of the fabric comprising the test sample (3.1), cut out 5 warpway test specimens P_1 , P_2 , P_3 , P_4 and P_5 and 5 weftway test specimens T_1 , T_2 , T_3 , T_4 and T_5 , taking care that the same group of warp and weft yarns is not repeated (see Fig. 1). Each specimen shall be 250 mm long and of sufficient width to yield about 150 warp or weft yarns.

*Glossary of textile terms — Natural fibres (first revision).

†Methods for sampling cotton fabrics for determination of physical characteristics.

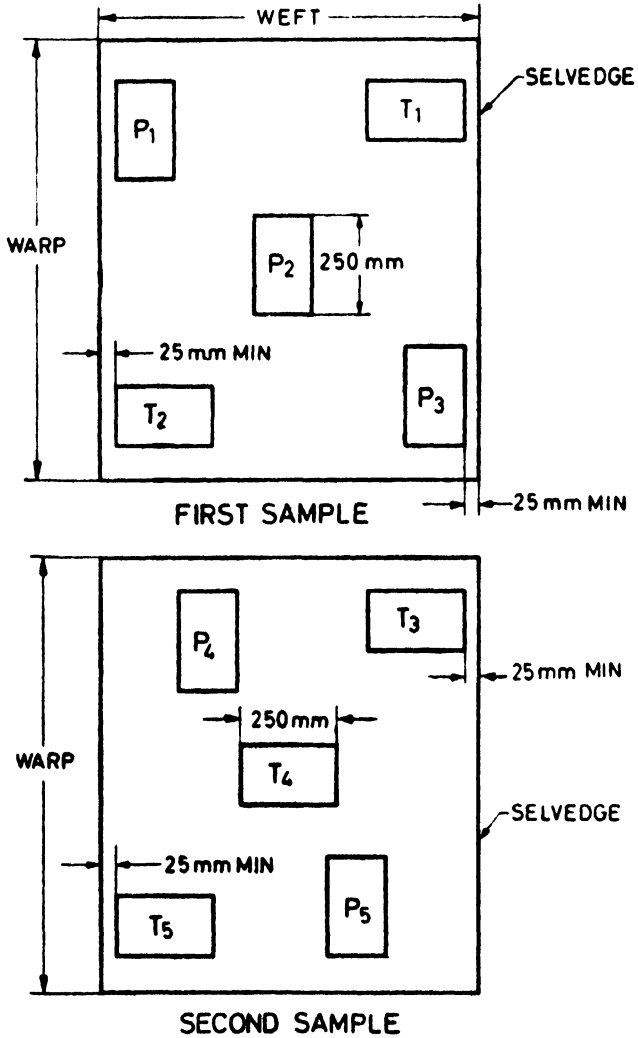


FIG. 1 LAYOUT OF TEST SPECIMENS

6. ATMOSPHERIC CONDITION FOR CONDITIONING AND TESTING

6.1 The test specimens shall be conditioned in standard atmospheric conditions of 65 ± 2 percent relative humidity and $27 \pm 2^\circ\text{C}$ temperature to moisture equilibrium from dry side (see IS : 6359-1971*).

6.2 The tests shall be carried out in standard atmospheric conditions.

7. PROCEDURE

7.1 Warp Yarn

7.1.1 For determining the approximate universal count of the warp yarn in tex, which is necessary for calculating the tension to be applied during the test, take one of the warpway test specimens. Draw two parallel marks 200 mm apart at right angles to the direction of warp. Remove 10 warp yarns and cut them along the marks with a sharp razor blade and template. Determine the mass of all the yarns in milligrams and calculate the approximate universal count of the yarn in tex by the following formula:

$$t = \frac{m}{2}$$

where

t = approximate universal count in tex of the warp yarn, and

m = mass in milligrams of 10 warp yarns.

7.1.2 Take the test specimen P_1 and draw two parallel marks 200 mm (l) apart at right angles to the direction of warp. Ravel a warp yarn out of the test specimen P_1 to a length of about 50 mm. Hold the yarn as close to the end as possible and fasten its loose end in the tension clamp so that one of the marks on the yarn coincides with the inner edge of the tension clamp. Pull the yarn out of the test specimen sideways, taking care not to stretch the yarn or release the other end of the yarn to avoid removal of any twist. Hold the yarn as close to the end as possible to avoid any untwisting. Draw the yarn through the other clamp and fix the yarn such that the second mark on the yarn coincides with the inner edge of the clamp. Measure the length of the yarn between the two marks in millimetres under a tension of $0.5 \text{ g/tex} \pm 10$ percent (it should be noted that the tex of yarn determined as in 7.1.1 for this purpose is only approximate). In a similar manner, determine the length between the marks of 9 other warp yarns. From the data thus obtained, calculate the average straightened length between the marks (l_1) of 10 warp yarns.

*Method for conditioning of textiles.

7.1.3 Calculate the crimp percent in the yarn by the following formula:

$$\text{Crimp percent} = \frac{l_1 - l}{l} \times 100$$

where

l_1 = average length in millimetres of the yarns when straightened, and

l = length in millimetres of the yarns while in cloth.

NOTE — The crimp percent may be determined by using crimp tester, following the procedure as prescribed in the instrument manual.

7.1.4 Cut the test specimen along the marks with a sharp razor blade and template. Remove sufficient number of warp yarns (*see* Note) out of the specimen so that the total length of the yarns removed is about 10 m, and place them in a suitable container.

NOTE — It may be necessary to trim off the protruding weft yarns frequently to avoid fraying of the warp yarns.

7.1.5 Calculate the total length (L) of the yarns collected in the container in millimetres taking the average length between the marks (l_1) determined as in 7.1.2, as the length of each yarn.

7.1.6 Make the yarns into bundles or loops and remove the finishing material as given in Appendix A. Determine the mass (M) of the yarns in milligram after conditioning (*see* 6.1).

7.1.7 From the data thus obtained, determine the universal count of the yarn in tex by the following formula:

$$\text{Universal count, in tex} = \frac{M}{L} \times 1\,000$$

where

M = total mass in milligrams of the yarns (7.1.6), and

L = total length in millimetres of the yarns (7.1.5).

7.1.8 Determine the crimp and count of the warp yarn in the remaining four test specimens, P_2 , P_3 , P_4 , and P_5 in a similar manner. Find the average of the 5 values in each case, round off these values to one

decimal place and report the values thus obtained as the crimp percent and count of the warp yarn.

NOTE 1 — If it is desired to express the result in any of the traditional count systems, use one of the following formulae as applicable:

$$a) \text{ Count in the direct system} = \frac{M}{L} \times 1000 \times C_1$$

where

M and L have the same meaning as in 7.1.7, and

C_1 = a constant corresponding to the count in the direct system in which the result is desired (*see* Table 1).

$$b) \text{ Count in the indirect system} = \frac{L}{M \times 1000} \times C_2$$

where

M and L have the same meaning as in 7.1.7, and

C_2 = a constant corresponding to the count in the indirect system in which the result is desired (*see* Table 2).

NOTE 2 — For factors and tables for conversion of yarn counts from one system to other, reference to IS : 3689-1966* may be made.

TABLE 1 CONSTANTS FOR DIRECT COUNT SYSTEMS

YARN COUNT SYSTEM	UNIT OF MASS USED	UNIT OF LENGTH USED	UNIT OF YARN COUNT	CONSTANT C_1
(1)	(2)	(3)	(4)	(5)
Denier	1 gram	9 000 metres	g/9 000 m	9
Jute	1 pound	14 400 yards (spynkle unit)	lb/14 400 yd	0.029 03

7.2 Weft Yarn — Determine the crimp and count of the weft yarn by taking the test specimens T_1 , T_2 , T_3 , T_4 and T_5 and following the procedure similar to the one prescribed in 7.1.1 to 7.1.8.

7.3 In case the determination of the crimp of the yarn in the fabric is not required and only the count is to be determined, the straightened length and mass of the yarn after desizing may be used for calculating the count.

*Conversion factors and conversion tables for yarn counts.

TABLE 2 CONSTANTS FOR INDIRECT COUNT SYSTEMS

(Clause 7.1.8)

YARN COUNT SYSTEM	UNIT OF LENGTH USED	UNIT OF MASS USED	UNIT OF YARN COUNT	CONSTANT C_1
(1)	(2)	(3)	(4)	(5)
Cotton (English)	840 yards (hank)	1 pound	840 yd/lb	590.5
Linen (wet spun)	300 yards (lea)	1 pound	300 yd/lb	1 654
Spun silk	840 yards	1 pound	840 yd/lb	590.5
Woollen (Dewsbury)	1 yard	1 ounce	yd/oz	31 000
Woollen (Yorkshire)	256 yards (skein)	1 pound	256 yd/lb	1 938
Worsted	560 yards (hank)	1 pound	560 yd/lb	885.8

8. REPORT**8.1** The report shall include the following information:

- a) Type of test sample
- b) Average crimp percent
 - 1) Warp
 - 2) Weft
- c) Average count
 - 1) Warp
 - 2) Weft

A P P E N D I X A

(Clause 7.1.6)

**TREATMENTS TO REMOVE SIZING AND OTHER FINISHING
MATERIALS FROM THE SPECIMENS OR THE YARNS
REMOVED FROM THEM**

A-1. If the type of finishing material used is known, follow the method as recommended in IS : 9068-1979*.

*Recommended methods for the removal of non-fibrous matter prior to quantitative analysis of fibre mixtures.

A-2. In case the type of finishing material is not known, proceed as follows:

Extract the specimens/yarns with benzene: methyl alcohol mixture in 3 : 2 ratio in a Soxhlet apparatus for 2 hours at a minimum rate of 6 cycles per hour. (This removes oils, fats, waxes, certain thermoplastic resins, etc.)

Extract the specimens/yarns with ethyl alcohol in a Soxhlet apparatus for 2 hours at a minimum rate of 6 cycles per hour. (This removes soaps, cationic finishes, etc.)

Treat the specimens/yarns with 200 ml of water at 50°C for 30 minutes, stirring occasionally with glass rod or mechanically. Rinse thrice with fresh portions of warm water (at 50°C) and dry. (This removes water soluble materials.)

Immerse the specimens/yarns in 200 ml of 0.1 N hydrochloric acid at 80°C for 25 minutes, stirring gently every 3 minutes. Rinse thoroughly with water at 80°C containing a few drops of ammonia and then finally with plain water. Remove excess water from the sample by squeezing or suction centrifuge and allow to dry. (This removes starches/aminoaldehyde compound resins.)

(Continued from page 2)

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ON

PHYSICAL METHODS OF TEST

IS :

233 (Parts I to VI)-1978 Methods for determination of length parameters of cotton fibres (*first revision*)

Part I General

Part II Estimation of length and length distribution by the array method

Part III Estimation of length and length distribution by fractionation method

Part IV Estimation of mean fibre length by cut and weight method

Part V Estimation of length and length distribution by the thickness scanning method

Part VI Estimation of length and length uniformity by the optical scanning method

234-1973 Linear density of textile fibres (gravimetric method) (*first revision*)

235-1954 Mean single fibre-strength and intrinsic strength (cotton)

236-1968 Cotton fibre maturity (by sodium hydroxide swelling method) (*first revision*)

684-1962 Nep count in cotton

832-1964 Twist in yarn

1315-1977 Linear density of yarns spun on cotton system (*first revision*)

1911-1960 Cotton fibre immaturity count-polarized-light method

1670-1970 Breaking load, elongation at break and tenacity of yarns (*first revision*)

1671-1977 Yarn strength parameters of yarns spun on cotton system (*first revision*)

1954-1969 Length and width of fabrics (*first revision*)

1963-1969 Threads per decimetre in woven fabrics (*first revision*)

1964-1970 Weight per square metre and weight per linear metre of fabrics (*first revision*)

1966-1975 Bursting strength and bursting distentions of fabrics: diaphragm method (*first revision*)

1969-1968 Breaking load and elongation at break of woven textile fabrics (*first revision*)

3442-1980 Determination of crimp and count of yarn removed from fabrics (*first revision*)

3674-1966 Micronaire value of cotton fibres

3675-1966 Bundle strength (tenacity) of cotton fibres

3689-1966 Conversion factors and conversion tables for yarn count

4681-1968 Wrinkle recovery of fabrics (by measuring crease recovery angle)

4871-1968 Lint and trash content of cotton by means of mechanical pneumatic machines

6359-1971 Conditioning of textiles

6489-1971 Tear strength of woven textile fabrics by elmdorf tester

6490-1971 Stiffness of fabrics-cantilever test

6668-1972 Preparing test specimens from fabric samples for physical tests

7702-1975 Thickness of woven and knitted fabrics

8357-1977 Assessment of fabrics drape

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